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ABSTRACT

One of the goals of the Strategies and Models for Improved Learning through Effective Data Use (SMILE) project was to develop a data-capacity survey (DCS) to measure a school's capacity to use data. In this study, a DCS was developed and field tested. The DCS, which was field tested at six Milwaukee Public Schools (Wisconsin), was a pen-and-paper survey designed to be completed as a group activity. The first section included a general description, instructions, a glossary, and three different data-use scenarios of school improvement, classroom, and project settings. The second section of the DCS contained 28 items with rubric-format or checklist format response areas. The DCS was designed to measure the concept of data capacity by deconstructing it into the inquiry process and sociotechnical dimensions. In general, field test results reveal both between- and within-school variation along both data capacity dimensions and across the three data-use scenarios. Findings further suggest that schools distinguish between differences in data capacity for each stage of the inquiry process, and that schools distinguish between the social and technical factors. Schools also showed variation across the three data-use scenarios. Some design issues related to the DCS were identified. The DCS took too much time to complete, was too complex, and schools tended to adjust their scores. These design features will be considered in the redesign of the DCS. (Contains 5 figures and 10 references.) (SLD)

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Understanding Schools' Capacity to Use Data

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Introduction

There has been a recent push for schools and districts to make better use of data in order to detect and react to problems, document successful interventions and strategies (Love, 2002; Schmoker, 1999, 1999b; Bernhardt, 1999; Johnson, 1997), and better understand how educational systems work (Willms, 1992). However, the process required to use data effectively has numerous inherent costs, many of which are encountered well before any benefits can be enjoyed. Schools that are effective data-users will minimize those costs where possible, while maximizing the positive effects of data-use. Helping schools to become more proficient data-users (i.e., improving their *data capacity)* requires not only an understanding of effective data practices, but also of the conditions that need to exist at a school to support those practices.

From the literature on systemic reform, we see an argument that posits that it is not sufficient for schools to want to reform; they must also have the capacity to reform (Massell, 1998; O'Day et al., 1995). However, the concept of reform capacity is not well understood and is often difficult to define (Massell, 1998). Capacity can only be measured in relation to *something*, such as a well-defined process or event. O'Day et al. (1995) define reform capacity as "the ability of the educational system to help all students meet more challenging standards" (p. 1). The authors note that reform capacity can be thought of as being a multi-dimensional trait. They suggest that teacher capacity is comprised of knowledge, skills, dispositions, and views of self. Furthermore, they suggest that teacher capacity interacts with organizational capacity (O'Day, 1995), which is also multidimensional, including vision and leadership, collective commitment and culture, knowledge (or access to knowledge), organizational structures, and resources.

Thus, they have systematically deconstructed the concept of reform capacity into more measurable traits.

Extending Massell's theoretical argument, we argue that schools must not only have the desire to use data, but they must also have the capacity to use data. More specifically, schools must have the capacity to use data to improve student learning. We will refer this as *data capacity*. One goal of the Strategies and Models for Improved Learning through Effective Data Use (SMILE) project is to develop a *data-capacity survey* (DCS) that can measure a school's *data capacity*.

The DCS is designed to serve two purposes. First, schools should be able to use the DCS to self-assess their own ability to use data while also receiving feedback regarding how to improve their *data capacity*. Repeated assessments with the DCS should provide schools with a way to evaluate the effectiveness of their efforts to improve their *data capacity*. Additionally, researchers should be able to use the instrument to study the impact of specific interventions, or otherwise further research in how data-use can be linked to improving schools.

Similar to O'Day's deconstructionist approach to studying reform capacity (O'Day et al., 1995), we have decomposed data capacity into two dimensions - the *inquiry-process* dimension and the *sociotechnical* dimension. The *inquiry-process* dimension represents the data inquiry process associated with using data within a school improvement context. This process can be cyclical and generally follows the steps of inquiry, data acquisition, data management, analysis, dissemination, and evaluation (Bernhardt, 1999; Love, 2002; Willms, 1992). While each stage is most likely necessary to successful data-use, none alone are sufficient. Furthermore, since each step depends on

successful completion of the previous steps, problems in early stages of the data inquiry process may propagate problems in later stages.

The *sociotechnical* dimension differentiates between social and technical factors. Support for such a dimension arises from the sociotechnical systems literature, which argues that there are social and technical factors that must be addressed when planning system design or improvement (Clegg, 2000; Pasmore, 1988). A central axiom, *joint optimization*, from sociotechnical systems theory posits that both social and technical factors must be addressed before system performance can be optimized. Examples of social factors that are likely to influence *data capacity* include staff support, organizational structures, communication, and organizational culture, whereas examples of technical factors include effective use of technology (e.g., district information resources or electronic data files), as well other technical processes, such as analyzing data and developing internal monitoring systems.

The remainder of this paper describes our development of the DCS, what we have learned from field-testing, and how those findings will impact the redesign of the DCS. Specifically, in the *methods* section we describe how the DCS is designed and how it was field-tested. In the *results and conclusions* section, we focus on analyzing the results of the field tests as they pertain to the design of the DCS, with emphasis on identifying the strengths, weaknesses, and design issues. Finally, in the *discussion* section we summarize changes to the DCS that are likely to occur as we address our preliminary findings.

Methods

Participants

The DCS, which was field tested on six Milwaukee Public Schools (MPS), comprised by two elementary schools (Kindergarten – 5th grade), two middle schools (6th – 8th grade), and two K-8 schools (Kindergarten – 8th grade). The schools vary in size and performance and reflect Milwaukee's cultural diversity.

Data-Capacity Survey (DCS)

The DCS has been developed over the last year, and has incorporated feedback from testing sessions in an on-going process. This section will describe the DCS as it currently exists, but the reader should be aware that the instrument has evolved throughout the testing sessions.

The DCS is a pen-and-paper survey designed to be completed as a group activity. The first section of the survey includes a general description, instructions, glossary of terms, and description of three different data-use scenarios - a *school-improvement* scenario, a *classroom* scenario, and a *project* scenario. The *school improvement* scenario portrays a situation where a school uses data within the context of developing, writing, and substantiating a school improvement plan. The *classroom* scenario presents an example of a school trying to use data to inform classroom changes within the context of improving student learning. The *project* scenario presents an example of a school using data to answer or track a school-wide question or program.

The second section of the DCS contains a total of 28 items and their response formats. Each item is comprised of a *stem question* and either a rubric-format or checklist-formatted response area (Figure 1). There are 18 rubric-formatted questions, for

Figure 1. Sample item from the DCS with a rubric response format

12) Which best describes how your school stores and maintains data?

Check the statement that best describes your school.	Education Plan Scenario	Assessing Classroom Learning	School Wide Problem
Mostly paper			
Some paper, some electronically			
Mostly electronically, no local database			
Mostly electronically, at least some in local database			

which each school team selects a descriptor (out of four options) that best fits their school. Ten checklist format questions (figure 2) require the school team to select any and all options that apply to their school. Items are grouped by response format to minimize errors caused by changes of survey-response format. Each item also has a response field for each of the three data-use scenarios. The rational for having multiple scenarios is that the way in which schools use data can vary greatly. Therefore, it is likely that a school's *data capacity* will also vary according to the context of the data-use. During our initial testing, we were curious as to whether or not the context of data use would affect schools responses, and if so, how.

The DCS is designed to measure the concept of *data capacity* by deconstructing it into the *inquiry-process* and *sociotechnical* dimensions. Four to six items assess each stage of the data-inquiry process. The first stage, *decision-making*, refers to the thinking and planning that should occur before schools begin to work with data. The *data-acquisition* stage focuses on tasks related to gaining access to and acquiring data. Work associated with organizing and maintaining data falls under the *data-management* stage

Figure 2. Sample item from the DCS with a checklist response format

22) Who are likely to use data to reflect and evaluate school and classroom decisions?

Check all that apply	Education Plan Scenario	Assessing Classroom Learning	School Wide Problem
Administration			
Program Implementer			
Literacy Coach			
Learning Coordinator			
Librarian			
Psychologist			
Counselor			
Lead Teachers			
Teachers			
Office personnel			

and tasks related to making sense of data and sharing conclusions are included together in the *analyzing and reporting* stage. The next stage, *application*, involves applying information and knowledge to improving school or classroom practices. Finally, the last stage occurs when schools *evaluate* their work in order to better understand whether or not the changes were successful and why.

The DCS is also organized on a *sociotechnical* dimension. This dimension can be broken down into social and technical factors. Thirteen items address social factors (see

figure 2 for an example), such as how many persons are involved in using data, and whether or not sufficient support is provided to those staff. Ten items assess technical aspects of data-use (see figure 1 for an example), such as how technology is used, what types of analysis methods are used, and other technical processes. Five items do not differentiate between social and technical factors.

Procedure

Each SMILE school selected was nominated by district leadership and the school's willingness to participate (measured primarily through interest by the school's administration). Schools assembled a team of four to ten staff members that included school administration (principal participation was required), teachers, and staff. SMILE researchers met with each team during a four-hour planning meeting, during which they completed a version of the DCS and established some preliminary project goals. Of this four-hour meeting, two hours were scheduled for the DCS; however, school teams required at least two and a half hours to complete the survey.

A SMILE researcher facilitated the completion of the DCS; school teams were told what to expect and that they should answer each item based on how the school is currently using data. The facilitator also emphasized that the teams answer each items honestly without regard to whether they were being judged or evaluated. In addition, teams were instructed to ask questions as they arise.

School teams were then asked to discuss each of the three data-use scenarios so that they could build a shared understanding of the different contexts in which data are used. Once they felt they understood the scenarios and what was expected of them, teams

were instructed to discuss each item until they had a shared understanding of the item's *stem question* and had formed a consensus on how to score their school for that item, for each data-use scenario. They would then progress to the next item. After completing the DCS, teams were given a short break and then completed a series of exercises with the purpose of selecting a project focus - while also mapping out factors that are likely to impact student learning within that focus. Feedback surveys were administered at the end of the four-hour session.

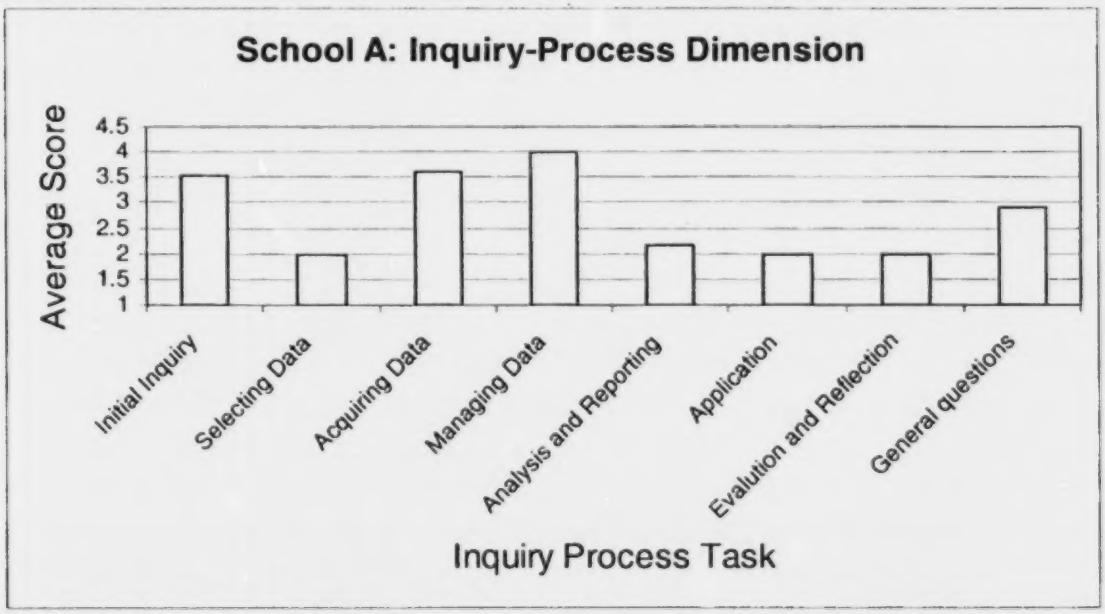
In addition to completing the DCS, school teams participated in monthly meetings with our SMILE staff, which was prepared to assist them in improving their *data capacity*. These monthly meetings produced a significant body of materials, which will be analyzed using qualitative methods. The results from the qualitative analysis will also be used as a basis for revising the DCS. Schools will then complete the revised DCS in September of 2003.

Results and Conclusions

Results will be discussed in terms of what the DCS field tests reveal about the conception and design of the survey. In general, results reveal between- and within-school variation along both *data capacity* dimensions and across the three data-use scenarios. Averaging responses along the *inquiry-process* dimension yields results that suggest that schools distinguish between differences in *data capacity* for each stage of the inquiry-process. For example, one school scored relatively high on the first three stages of the *inquiry process,* but scored relatively low on later stages (figure 3). Note that

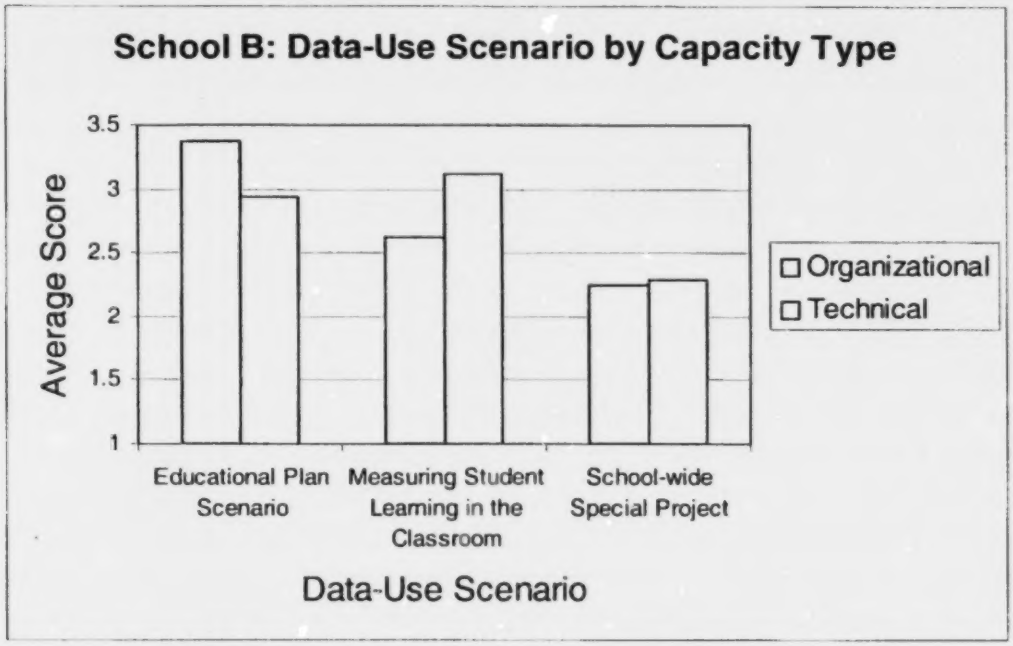
figure 3 includes a stage for selecting data that has subsequently been eliminated from the survey design.

Figure 3. Analysis of one school along *inquiry-process* dimension



Analyzing responses along the *sociotechnical* dimension (figure 4) also shows that schools can differentiate between the social and technical factors. Figure four shows how one school appears organized to use data for a school improvement scenario, but less so for using data within the classroom, or to answer a school wide project. However, a problem arises when one tries to identify best practices for certain organizational structures. For example, a school with a highly centralized data process may have a higher capacity than a school using a distributed model, especially for data-use scenarios that do not necessarily require distributed participation. This challenge reflects one difficulty of creating the DCS, namely that there may be multiple models for effective data use.

Figure 4. Analysis of one school across the *sociotechnical* dimension

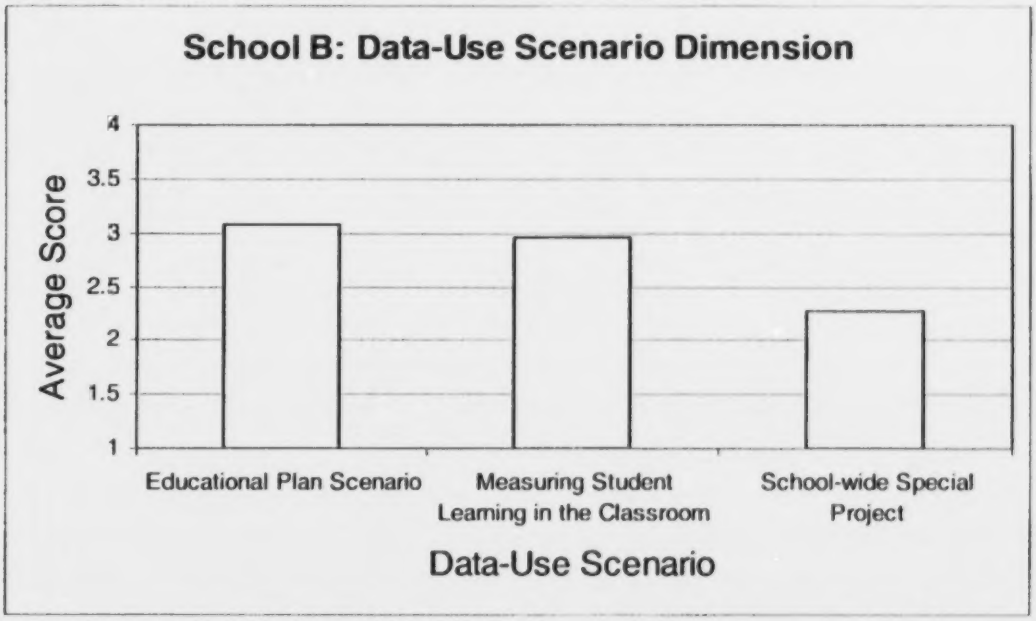


Schools also showed variation across the three data-use scenarios, providing evidence that the context of data-use is an important variable to control for when studying how schools use data. In general, schools appeared to score themselves differently for each of the three scenarios (figure 5). Looking at interactions between data-use scenario and the other two dimensions also suggests that schools scored themselves differently depending on the context of using data (figure 4). These trends suggest that schools score themselves relatively high on some data-use scenarios and low on others. Thus, the context of data-use appears to be an important factor when measuring a school's *data capacity*.

The structure of the rubrics appear to be appropriate in that most responses were in the bottom half of the four-point scale, suggesting that the DCS response options are properly phrased and can potentially show growth in a school's *data-capacity* over time.

However, this trend is also evidence of a possible floor effect, such as might be the case when scores stay low, even in schools that are thought to be schools with high *data capacity*. Future changes will be evaluated in terms of whether or not responses appear to be abnormally low or high, and whether or not they show change.

Figure 5. Analysis of one school across Data-Use Dimension



Looking at how the schools completed the DCS reveals several design issues related to the administration of the survey. First, the DCS requires too much time to complete. None of the schools completed the instrument within the targeted two-hour provided for. Furthermore, despite the efforts of the facilitators to keep the teams on pace, many were rushed to complete it within 2.5 hours. Understandably, many of the school teams showed signs of fatigue towards the end of the DCS. This finding was true for all schools, despite on-going efforts to revise the DCS between site visits. This is a central design issue that must be addressed.

Another problem was that schools were susceptible to adjusting their scores (in both directions). Some schools would purposively round their scores down when the group was split between two different rubric options so that they could have some room to improve. Another school team scored its school relatively high; but based on our experiences with this school over the subsequent school year, it would appear that they are one of the schools with relatively lower data-capacity. It is unclear what motivated this school to inflate its scores. It is also important to note that schools were given explicit instructions, along with reminders throughout the session, to answer honestly and without regard to how the school might appear, suggesting that these instructions were discounted by the team. This is another central issue for the DCS because score inflation will impact the validity and reliability of the survey.

Several school team members reported back to SMILE staff that they valued the discussion that arose during their DCS sessions. Indeed, we observed a great deal of productive and focused dialogue during the DCS sessions. For example, members would often discuss various aspects of how their school uses (or not) a particular source of data. Since data-related processes are often distributed across multiple staff members, most team members had only a limited understanding of all the data work that occurred at their schools. These types of discussion are one reason why the instrument required so much time to complete. It is unclear whether shortening the DCS without also eliminating much of this data-dialogue is possible.

Another finding is that schools perceived the DCS as being too complex. One source for this perception lies in how the DCS is structured. Namely, teams would first read an item's stem question, discuss its meaning, read and discuss the item's response

options, and then respond to the item for each of the three data-use scenarios. While the teams showed some ability to speed up as they progressed through the survey, it was nevertheless a slow and deliberate process. Another source for this perception might be that the process of using data in schools is often complex, as well as distributed. For example, a school may rely on several people within the school to process and use data yet those staff members maybe unaware of how their individual responsibilities are integrated into an overall system. Therefore, the DCS may be perceived as being too complex, not because it is overly structured or too detailed, but because the process of using data is more complex than staff had previously understood it to be. This explanation is supported by our observations that many team members discovered new aspects of how their school uses data and for what purposes.

Discussion

In interpreting these findings, it is important to keep in mind that the goals of the data capacity survey are two-fold. First, the DCS is designed as a self-assessment tool for schools wanting to improve their ability to use data. Furthermore, the DCS is designed to be useful to researchers by providing a way to measure a school's capacity to use data. It is unclear at this point whether or not these two goals are compatible. Preliminary results suggest that we should continue to use the *inquiry-process* and *sociotechnical* dimensions as both appear to be useful ways of organizing and understanding the actual processes that schools use, as well as the conditions that are necessary to support those processes. The question is: How do we make the DCS easier to complete, while at the same time improving its utility.

One likely method for increasing the utility of the DCS is to develop a guide to aide schools in interpreting their results. This guide would help schools self-analyze their results to understand what the DCS is telling them about their ability to use data. Additionally, in the case where capacity is low, the interpretive guide will suggest where and how a school might want to focus their resources.

A major problem is that the DCS requires too much time to complete. Not unrelated to this problem is the perception that the DCS is too complex. An area that is likely to be revised is the number of data-use scenarios. Reducing the number of scenarios will likely accomplish two goals: First, schools will be able to complete the DCS in less time. Second, it will appear to be less complex. The argument against doing so is that the validity of the DCS's may suffer. Furthermore, the rich dialogue observed may as well be diminished. While, this eliminating one or two of the data-use scenarios will surely reduce the amount of time required to complete the DCS, it will also likely decrease the utility of the survey. Another option under review is to split the DCS into three versions, one for each data-use scenario. Schools could then complete the DCS scenario that best fits their needs - or if they prefer to do all three scenarios, split the total time into more manageable sessions. One option not being considered is that of reducing the number of items. This option would not necessarily result in significant reductions in time.

A second problem is that the instrument must be redesigned to elicit more reliable and valid responses. While it is unclear why one school appeared to inflate its scores, the instrument should be reviewed from the perspective of whether or not each item provides

a school with concrete and well defined criteria. Finally, improving the saliency of instructions that remind schools to respond honestly might be helpful.

In summary, we plan to separate the DCS into self-contained modules that each contain only one of the three data-use scenarios. In addition, a guide will be developed for each module to aide schools in interpreting their responses and in providing suggestions for where a school might want to focus their resources when trying to improve their *data capacity.* Results from qualitative analysis of field notes and other project materials will also be taken into account during the redesign of the DCS.

References

Bernhardt, V. L. (1999). *The school portfolio: A comprehensive framework for school improvement (2nd ed.)*. Larchmont, NY: Eye On Education.

Clegg, C. W. (2000). Sociotechnical principles for system design. *Applied Ergonomics, 31*, 463-477.

Johnson, J. H. (1997). Data-driven school improvement. *ERIC Digest, January 1997*, (109), 2-3.

Love, N. (2002). *Using data/Getting results: A practical guide for school improvement in mathematics and science.* Norwood, Massachusetts: Christopher-Gordon Publishers, Inc..

Massell, D., & Consortium for Policy Research in Education. (1998). *State strategies for building capacity in education: Progress and continuing challenges* (CPRE Research Report Series RR-41). Philadelphia: Author.

O'Day, J., Goertz, M. E., & Floden, R. E. (1995). *Building capacity for education reform.* New Brunswick, NJ: Rutgers, The State University of New Jersey, Consortium for Policy Research in Education. ERIC: 390 118.

Pasmore, W. A. (1988). *Designing effective organizations: The sociotechnical systems perspective.* New York: Wiley.

Schmoker, M. (November 3, 1999). The quiet revolution in achievement. *Education Week, 19*, 32-35.

Schmoker, M. (1999). *Results: The key to continuous improvement.* Alexandria, VA: Association for Supervision and Curriculum Development.

Willms, J. D. (1992). *Monitoring school performance.* Washington, DC: The Falmer Press.

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